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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/789,371	DITTRICH ET AL.
	Examiner	Art Unit	
	Angela M. Lie	2163	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>11 April 2007</u>.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-20</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-9, 12-17 and 20</u> is/are rejected.

7)☒ Claim(s) <u>10, 11, 18 and 19</u> is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>26 February 2004</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

2.   <u>Claims 1, 12 and 20 are rejected under 35 U.S.C. 103(a) as being</u>

<u>unpatentable over Schiefer et al (US Patent 5761653) in the view of Witkowski et</u>

<u>al (US Publication 2004/0034616).</u>

<u>As to claims 1 and 20</u>, Schiefer teaches a computer implemented method and

apparatus for reducing redundancy within a data model in a database (column 3, lines

19-24), wherein the data model is represented by at least one table (column 3, lines 46-

48), the method comprising: determining a number of distinct values of partial keys in a

table (column 5, lines 47-52), wherein each partial key identifies at least one row in the

table; determining whether a first partial key of the partial keys and a second partial key

of the partial keys are functionally dependent, the first partial key and the second partial

key comprising a pair (column 8, lines 1-8); and eliminating one or more columns having

functional dependencies from the table (column 9, lines 39-44). Schiefer does not teach

reordering one or more columns based on the cardinality of partial keys or he does not

<u>explicitly</u> teach the structure of the table as disclosed in further claims, however

Witkowski clearly teaches the tables comprising partial and figure keys and he also

teaches managing relational databases wherein the tables are ordered based on their

cardinality (paragraphs 516 and 517). It would have been obvious to one of the ordinary

skill in the art during the time the invention was made to order the columns according to

their cardinality as taught by Witkowski, in Schiefer's relational database, because

ordering the columns based on their cardinality allows to improve compression ratio (i.e.

more efficient memory management).

As to claim 12, Schiefer teaches a computer implemented method and

apparatus for reducing redundancy within a data model in a database (column 3, lines

19-24), wherein the data model is represented by at least one table (column 3, lines 46-

48), the method comprising: determining a number of distinct values of partial keys in a

table (column 5, lines 47-52), wherein each partial key represents at least one row in

the table; determining whether pairs of partial keys are functionally dependent (column

8, lines 1-8); and eliminating one or more columns having functional dependencies from

the table (column 9, lines 39-44); and creating an exception list for the pairs of partial

keys that are not functionally dependent (column 9, lines 39-44, wherein the list is the

catalog of the columns that were not deleted sine they were not functionally dependent).

Schiefer does not teach reordering one or more columns based on the cardinality of

partial keys. Witkowski teaches managing relational databases wherein the tables are

ordered based on the cardinality (paragraphs 516 and 517). It would have been obvious

to one of the ordinary skill in the art during the time the invention was made to order the

columns according to their cardinality as taught by Witkowski, in Schiefer's relational

database, because ordering the columns based on their cardinality allows to improve

compression ratio (i.e. more efficient memory management).

3.   **Claims 2-9 and 13-15 are rejected under 35 U.S.C. 103(a) as being**

unpatentable over Schiefer et al (US Patent 5761653) in the view of Witkowski et

al (US Publication 2004/0034616) and further in view of White et al (US Patent

5918225).

As to claim 2, Schiefer teaches all the limitations discloses in claim 1, however

he does not teach placing the one or more eliminated (deleted) columns into a separate

table so that the column with a highest cardinality is in the leftmost position, and the

column with the lowest cardinality is in the rightmost position.

White teaches optionally eliminating at least one column from the table storing

user data and the possibility of reconstructing it later (what means that the eliminated

columns have to be stored) (column 50, lines 4-9).

Witkowski teaches ordering columns based on their cardinality (i.e. lowest to the

highest) (paragraph 517).

It would have been obvious to one of the ordinary skill in the art during the time

the invention was made to store eliminated columns as taught by White and organize

them from the highest to the lowest cardinality as indirectly taught by Witkowski (even

though Witkowski teaches ordering the columns from the lowest to the highest

cardinality, it would have been obvious to order those columns from the highest to the

lowest cardinality because it would require mere change in coding and it is simply just a

design choice), in the relational database tables as taught by Schiefer because storing

eliminated columns for possible future use allows greater flexibility in data organization,

furthermore once deleted columns might be useful in the future, or the important

columns might be removed by mistake, therefore storing removed data could provide

possible back-up.

As to claim 3, Witkowski teaches the method wherein partial key K(i) comprises

a partial key with an index i (paragraph 3) and a value Kri (Figure 1, any entry below

the indexes) for a tuple t(r) in row with index r (Figure 15, element 1501), and wherein

the number of distinct values of K(i) comprises cardinality |K(i)| (paragraph 591).

As to claim 4, Witkowski teaches the method wherein a table T comprises k key

figures (Figure 15, elements starting from D2L1-D2L3) and d partial keys K(1),..., K(d)

(Figure 15, elements D1L1-D1L4).

As to claim 5, Witkowski teaches the method wherein a table T comprises n

tuples and d+k columns (Figure 15, elements 1502-1 to 1502-5), wherein the n tuples

comprise rows (wherein tuple is considered to be a row extending trough at least one

column).

As to claim 6, Schiefer teaches the method wherein a function F(x) = y (it is

considered that this function describes equating two partial keys) comprises a mapping

between partial keys x and y in a same tuple (column 7, lines 31-43, wherein comparing

any two rows in different columns also allows to compare two rows in the same tuple).

As to claim 7, Schiefer does not explicitly teach that the Boolean flag, however

Witkowski teaches the method wherein certain parameters are set to true prior to

executing of the program (paragraph 358). It would have been obvious to one of the

ordinary skill in the art during the time the invention was made to use Boolean flag to compare two values, because this comparison method is very well known in the art (the "if" statement is based on Boolean value of true or false).

As to claims 8 and 15, Schiefler teaches the method wherein defining F from each partial key to every other partial key (wherein the partial key is one entry in the table) to its right in a reordered table for each row in table T (column 5, lines 47-52, wherein if one row is deleted, the remaining rows have to be reordered/renumbered because otherwise there would be unnecessary gap in the row order, furthermore the function); determining a functional dependency exists when the function $F(Kri) = Krj$ is the same function for each tuple $t(r)$ in the table for values of index i (wherein index represents numbering of columns) from 1 to (d-1) and for values of j from (i+1) to d (column 7, lines 30-44, wherein if there is only one row in the column, then the functional dependency is checked for each tuple).

As to claim 9, Schiefler teaches the method wherein when a tuple t is in the table T and $F(Kri)$ is not equal to Krj, a functional dependency does not exist between column I and j (column 7, lines 32-44, wherein if two rows have nothing in common (no common element) then they do not have functional dependency).

As to claim 13, Witkowski teaches the method wherein partial key K(i) comprises a partial key with an index i (paragraph 3) and a value Kri (Figure 1, any entry below the indexes) for a tuple $t(r)$ in row with index r (Figure 15, element 1501), and wherein the number of distinct values of K(i) comprises cardinality |K(i)| (paragraph 591), wherein the tuple t comprises k key figures (Figure 15, elements starting from

D2L1-D2L3) and d partial keys K(i) for i from 1 to d (Figure 15, elements D1L1-D1L4),
wherein a table T comprises n tuples and (d + k) columns (Figure 15, elements 1502-1
to 1502-5), wherein the n tuples comprise rows, and wherein a function F(x) = y
comprises a mapping between partial keys x and y in a same tuple (column 7, lines 31-
43, wherein comparing any two rows in different columns also allows to compare two
rows in the same tuple).

    As to claim 14, Schiefler teaches the method the exception list for the pairs of
partial keys that are not functionally dependent comprises partial keys pairs that do not
fit a functional dependency defined for other tuples in the table (column 9, lines 39-44,
wherein the list is the catalog of the columns that were not deleted sine they were not
functionally dependent). Schiefler does not explicitly teach the exception list also
representing errors with data models, however Witkowski teaches that the errors
regarding run time or null contain produce the error. It would have been obvious to one
of the ordinary skill in the art during the time the invention was made to also report the
errors because this is common practice, and furthermore it is highly desirable to see
possible error at least for the purposes of troubleshooting.

Allowable Subject Matter

4.   **Claims 10, 11 and 16 - 19 are objected** to as being dependent upon a rejected
base claim, but would be allowable if rewritten in independent form including all of the
limitations of the base claim and any intervening claims and if the rejections under 35
U.SC 101 and 112 second paragraph regarding claim 1 would be orvercome.

5.   The following is a statement of reasons for the indication of allowable subject

matter:

As to claim 10, the prior art fails to teach the method as disclosed in all the

preceding claims and further wherein determining whether pairs of partial keys are

functionally dependent comprises the steps as disclosed in claim 10.

As to claim 11, this claim would be allowable by the virtue of its dependency on

claim 10.

As to claim 16, the prior art fails to teach the method as disclosed in all the

preceding claims and further wherein upon determining multiple mappings, checking

whether one or more entries is set Krj are similar for each t(r).

As to claims 17-19, those claims would be allowable by the virtue of their

dependency on claim 16.

Response to Arguments

6.   Applicant's arguments filed November 24, 2006 have been fully considered but

they are not persuasive.

7.   On page 10, the applicant alleges that Schiefer does not teach a "partial key"

identifying at least one row in a table. The applicant further states that in contrast to the

invention, Scheifer's "key" consists of "columns". The examiner maintains the rejection

because it is well known in the art that columns comprise at least one row, and the

applicant defines a partial key as at least one row in a table, therefore the "key" as

defined by Schiefer satisfies the claimed limitation.

8.   In the following paragraph, the applicant asserts that Witkowski does not teach "reordering one or more columns of the table by cardinality of partial keys, wherein the cardinality of a partial key represents a number of distinct values of the partial key". The applicant acknowledges Witkowski's teaching about a content of a particular row, however the applicant distinguishes between the partial key as identification of at least one row in a table and "the content of a particular row". The examiner, however, maintains that identification of a row either by its content or index (which is not specified in a claim) is still considered identification. Furthermore, the partial key can be considered as content of a particular row, or a group of rows forming a column.

9.   With respect to the applicant's assertion also on page 10, stating that neither Schiefer nor Witkowski discloses "determining a number of distinct values of partial keys in a table, wherein each partial key identifies at least one row in the table" and "reordering one or more columns of the table by cardinality of partial keys, wherein the cardinality of a partial key represents a number of distinct values of the partial key", the examiner disagrees. Schiefer teaches that the duplicate rows can be removed (column 5, lines 47-55). Consequently, in order to determine duplicates, the number of distinct values of partial keys has to be established, wherein "partial key" is considered to be a content of at least one row. Furthermore, as to address second limitation teaching, "reordering one or more columns", in the Final rejection, the examiner clearly pointed to the passage in Witkowski's reference teaching this limitation, particularly in paragraphs 516 and 517. In particular Wikowski discloses in paragraph 517, that columns can be

ordered according to their cardinality according to the content of a particular rows,

wherein the content of the at least one row is considered to be a "partial key".

The Prior Art

10.   The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure.

-    Potapov et al (US Publication 2005/0004936) discloses the fact table

storage wherein the data in the table is divided into the segments.

-    Colby et al (US Publication 20020077997) discloses the database in the

form of table comprising indexes and wherein particular columns are

removed if functional dependency is established.

Inquiry

11.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Angela M. Lie whose telephone number is 571-272-

8445. The examiner can normally be reached on M-F.

12.   If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Don Wong can be reached on 571-272-1834. The fax phone number for the

organization where this application or proceeding is assigned is 571-273-8300.

13.   Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Angela M Lie
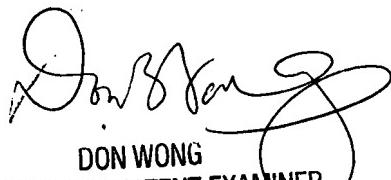
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